

Factsheet

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(Replaces OMAFRA Factsheet *Lawn Maintenance*, Order No. 03-059)

INTRODUCTION

Maintaining a healthy lawn involves using good maintenance practices throughout the growing season. Proper mowing, fertilizing, irrigation and thatch control provide a dense, healthy, high-quality lawn.

MOWING

The importance of good mowing practices is often overlooked. Mowing has a major influence on the turf density, uniformity and aesthetic quality of a home lawn. It is also the most repetitious and time-consuming maintenance practice and is often done incorrectly.

Frequency and Height

Turf can be mowed frequently, provided no more than one-third of the grass blade is removed in a single mowing. Mow as high as possible. Lower mowing produces a shallow root system. Shallow grass roots cannot take up enough water and nutrients, making the lawn susceptible to drought stress. Low mowing encourages broadleaf weed invasion and invasion from grassy weeds such as creeping bentgrass and annual bluegrass. It is best to mow a lawn when the leaves are dry. Dry grass cuts cleanly, and clippings distribute more evenly.

Clippings

Leave clippings on the lawn. If they are excessively heavy, rake them up and remove them. Clippings contain nutrients and water, breakdown rapidly and do not contribute significantly to thatch. You can cut down your fertilizer (especially nitrogen) by 20%–35% by leaving the clippings on.

Mowers

Mowers need the capacity and power to handle the area being mowed. Consider weight, ease in starting, manoeuvrability, ease of adjustment of height of cut and safety features. Keep mower blades sharp for a good quality cut. Select mulching-type mowers that recycle grass clippings.

New to the market are electric cordless rotary and reel mowers. They are a quieter, cleaner, low-maintenance alternative to a gas-powered lawn mower.

FERTILITY

Understanding and implementing a well-balanced fertilizer program is one of the most important factors in maintaining an attractive healthy lawn. The three main nutrients required by lawns are:

- nitrogen (N)
- phosphorus (P)
- potassium (K)

Nitrogen promotes dark green colour, leaf and blade development, and density of the turf. Phosphorus is important for good root and rhizome development and promotes plant maturity. Potassium contributes to the general vigour of the plant and promotes wear, drought tolerance and winter hardiness.

Amount of Nutrients

The amount of nutrients required by a home lawn is best determined by soil testing. A soil test will provide the amount of phosphorus, potassium, sulphur or lime required. There is no soil test for nitrogen. Generally, 1.5–2 kg/100 m² of actual nitrogen can be applied throughout the season, split into 2–4 applications. In the absence of a soil test, a 4-1-2 ratio (N-P-K) such as 20-5-10 is recommended. The three numbers on the fertilizer bag represent the amount of N, P and K, in that order. For example, the 20-5-10 fertilizer ratio listed above contains 20% N, 5% P₂O₅ and 10% K₂O. Nitrogen has to be applied every year, while phosphorus and potassium are relatively stable in the soil. If the lawn is on sandy soil, higher potash or more frequent applications may be required because it may leach. On newly established lawns, higher levels of phosphorus and potash may be required.

Table 1. Common turf nitrogen fertilizers and their properties.

Type	Examples	Response	Problems	Water Solubility	Potential for burn
Inorganic	• ammonium nitrate • ammonium sulfate	• immediately available • quick green-up	• readily leaches • causes lush growth	high	high to very high
Organic	• activated sewage sludge • animal by-products • plant by-products	• slow release • low leaching	• more expensive than inorganic forms	low	low
Synthetic	• IBDU • urea formaldehyde • sulfur-coated urea • polymer-coated urea	• slow release • low leaching	• release rate is dependent on temperature or moisture levels depending on the source	very low	low to very low

Fertilizers

Common turf nitrogen fertilizers and their properties are listed in Table 1.

Timing

The timing of fertilizer application is determined by the total amount of fertilizer you wish to apply to your lawn. Table 2 has some suggested timing of fertilizer applications based on the number of yearly applications.

Late-fall fertilization with a quick-release nitrogen fertilizer is beneficial for home lawns. Apply when the lawn has stopped growing but is still green. It:

- increases fall and spring root growth
- promotes a thicker lawn
- results in an early spring green-up

The lawn will green up earlier in the spring and will not give the rapid flush of shoot growth that occurs with spring-applied nitrogen.

Application

An even application of lawn fertilizers is very important for achieving a uniform green lawn. If using a drop-type spreader, operate it the long way of the lawn. First apply header strips at each end of the lawn

to provide room for turning. Overlap one wheel's width when spreading the fertilizer and shut off the spreader when reaching the header strips.

With a centrifugal type spreader, make two split applications (half rate each) at right angles to each other. Always make sure the spreader is properly adjusted, to avoid striping or uneven colour.

IRRIGATION

When normal rainfall does not provide enough moisture during the growing season, grass goes dormant and turns brown. To ensure a high-quality lawn, the lawn must be watered. Signs that a lawn needs water include:

- footprints remain while walking across the lawn
- a slight change in colour to dark blue-green
- grass blades folding inwards

Frequency and Timing

Water in the early morning when there is little or no wind. This provides more even water distribution. Water before mid-day, when the evaporation rate is the lowest. Watering can be done in the evening, but this may encourage disease development. Most disease-causing fungi require several hours of leaf wetness for infections and disease to occur.

Table 2. Suggested application timing of lawn fertilizer based on number of yearly applications.

Number of yearly applications*	Early Spring	Late Spring	Early Summer	Late Summer/ Early Fall	Late Fall
1	—	—	—	1st application	—
2	—	2nd application	—	1st application	—
3	—	3rd application	—	1st application	2nd application
4	—	3rd application	4th application	1st application	2nd application

* each application consists of 0.5 kg of nitrogen per 100 m²

Amount of Water

Too much water can cause thatch, fertilizer leaching, increased disease or grassy weed problems such as creeping bentgrass, annual bluegrass or rough bluegrass. Too little water applied frequently can cause shallow rooting of the turf, which makes the lawn susceptible to disease, drought stress or winter injury. Infrequent, thorough watering is best. When the lawn wilts, wet the entire area to a depth of 10–20 cm. The amount of water required to achieve this depends on soil characteristics. To measure how much water has been applied, place a straight-sided can or jar in the area being watered, and run the irrigation or sprinkler for 15 minutes. Check the water level in the can or jar. Approximately 2.5–4 cm of water in the can corresponds to an adequate irrigation of the lawn. If the sprinkler delivered 0.5 cm in 15 minutes, you will need to water for 1.25 hours to get the required 2.5 cm. Areas of the lawn needing more water include slopes, areas near buildings, curbs, sidewalks and light soils. Low-lying areas, shaded areas and heavy soils may not need as frequent irrigation.

Irrigation Equipment

Hose watering is suitable for small areas only. A sprinkler attachment provides adequate coverage for an average-size lawn despite the inconvenience of moving the sprinkler and how much water may be wasted. An underground irrigation system is the most expensive, but also the most efficient method, and may be considered for very large lawns or industrial properties.

Dormant Lawns

During extended dry periods, a lawn may turn brown and go dormant. A lawn can survive from 4–6 weeks in a dormant state during summer dry periods. Once the rains return, the lawn will green up in 7–10 days. If the lawn is dormant:

- Keep traffic off.
- Stop mowing.
- Do not fertilize.

THATCH

Thatch is a layer of organic matter made up of decaying grass leaves, stems and roots that build up in between the lawn and soil surface. It is a common problem on Kentucky bluegrass lawns, that have been established for several years and over-watered and over-fertilized.

Identification

A thatchy lawn feels very spongy when walked on. Cut a triangular patch of lawn with a sharp knife and lift it

back to measure the thickness of the thatch layer. More than 2.5 cm of thatch is too much.

Why Is Thatch a Problem?

Thatch harbours insects and diseases. Thatch can restrict grass roots from growing into the soil root zone, resulting in a shallow rooted lawn. Thatch interferes with water infiltration.

Minimizing Thatch

Cultural practices that minimize thatch development:

- frequent mowing
- proper watering
- proper fertilization

Remove excess thatch by vertical mowing or core aerating. Core aerate using a hollow steel tine core aerator, which removes cores of soil. This physically breaks up the thatch, brings up beneficial soil micro-organisms that help break down the thatch and alleviates compaction.

Timing

Dethatch or aerate in spring and fall during periods of good growth, allowing for quick lawn recovery.

OVERSEEDING AND SODDING

Overseeding is a method of thickening up a lawn that has become thin or damaged by insects, diseases, weeds, drought, excessive traffic or other types of damage. To ensure success, add compost, peat or topsoil before overseeding. Overseed at double the seeding rate for establishing a new lawn. The best time to overseed a lawn is in the fall (mid-August to mid-September). Keep the overseeded area moist by watering several times a day. One week after seeding, reduce watering to twice a day until seedlings are established.

Sodding is another method of repairing damaged lawns. Cut out dead or damaged areas to a depth of roughly 4 cm. Rake the soil, add fertilizer and place the sod on top of the soil. Insure good sod/soil contact by stepping on the sod or rolling it. For the best results, sod should be watered within an hour of being laid. Water sod frequently and make sure it does not dry out until it is fully rooted. Newly sodded areas will be rooted in 10 days to 2 weeks. See the OMAFRA Factsheets, *Lawn Establishment*, Order No. 08-025w, and *Lawn Renovation*, Order No. 08-021w, for more information on overseeding and sodding and Table 3 for a summary of the timing for fertilization, mowing, irrigation, overseeding and aeration.

Table 3. Seasonal lawn care calendar.

	Early Spring (May)	Late Spring (June)	Summer (July)	Late Summer (August)	Fall (September)	Late Fall (October)
Fertilization (N-P-K) P and K to be established by soil tests		Application	Application only if lawn irrigated regularly or a wet season.	Application		Application (late October)
Mowing	Mow as high as possible. Do not remove more than one-third of the leaf blade with each mowing.					
Irrigation	To keep turf from going dormant, irrigate at least once a week with 2.5 cm of water if there is insufficient rainfall. Irrigation will help turf withstand grub feeding.					
Overseeding		Application, if turf has been damaged by diseases or insects.		Application, if turf has been damaged by diseases or insects.		
Aeration		application		application		
European Chafer and Japanese Beetle	Check for grub damage.	Overseed or sod damaged areas.		Check for small grubs. Apply beneficial nematodes for marginal control if large numbers of grubs are found.		Check for grub damage.
Hairy Chinch Bug			Check for chinch bugs.	Overseed or sod damaged areas.		
Sod Webworm					Check for sod webworm. Overseed or sod damaged areas.	
European Crane Fly	Check for leatherjackets.	Overseed or sod damaged areas.				
Diseases (turf diseases are treated with cultural practices)	Assess snow mould damage, rake to encourage the turf to dry up and fertilize lightly to encourage recovery.	Monitor for leaf spot, especially in excessively wet springs followed by hot, humid conditions. Raise mowing height and fertilize lightly to encourage recovery. Avoid heavy applications of nitrogen in early spring to minimize leaf spot and melting out.	Monitor for necrotic ring spot. If it is a problem, aerate and overseed with perennial ryegrass in the late summer/early fall.	Continue monitoring for necrotic ring spot. Follow cultural practices in previous column. Monitor for dollar spot. Fertilize if dollar spot becomes a problem.	Monitor for rust. If rust is a problem, fertilize turf. Avoid fertilizing from mid-Sept. to mid-Oct.	

WEED MANAGEMENT

A thick, vigorous lawn is the best prevention against weed invasion. A dense stand of turf can compete successfully with weed seedlings for light and nutrients. Low mowing encourages broadleaf weed invasion and invasion from grassy weeds such as creeping bentgrass and annual bluegrass. Provided that a lawn is mowed in a timely fashion, at the proper mowing height, fertilized regularly and irrigated properly, weed invasion can be kept to a minimum.

Problem weeds include both broad-leaved and grassy weeds. They may occur when there are thin or damaged areas or heavily trafficked areas.

Control

Control problem weeds by:

- hand-pulling
- hand-raking
- mowing to prevent seed formation
- applying corn gluten meal product for pre-emergence control of crabgrass

INSECT MANAGEMENT

A healthy, well-maintained lawn is the best defence against insect invasion. Insect damage is usually less severe on well-watered lawns. Insects that infest home lawns are generally difficult to notice and their presence goes undetected until significant damage has

been done. Insect damage can often be mistaken for drought damage. If the lawn remains brown or shows signs of thinning out despite watering, try closer examination for insects. Regular inspection of the lawn including leaves, stems, roots, thatch and soil will help to determine if the problem is insect-related. The most common lawn insect pests are:

- hairy chinch bug
- grubs
- sod webworms
- European crane fly
- bluegrass billbug
- turfgrass scale

A summary of the major turf insect pests, how to identify them and the damage they do can be found in Table 4.

Hairy Chinch Bug

Hairy chinch bug damage starts to become noticeable from mid-July to mid-August. This insect causes damage by sucking plant juice from the grass stems with its piercing and sucking mouth parts. The first signs of damage are small, fist-sized sunken areas in the lawn. As the insects continue to feed, these areas can grow very rapidly into large dead areas. Damaged areas are often taken over by weeds. Adults are very small (4 mm long), and their wings form an X on their backs. One method of detecting chinch bugs is to cut the ends of a metal can to make a cylinder, force it into the ground, then fill the cylinder with water. Chinch bugs will float to the surface if they are present in the lawn. An alternative method is to cut a square piece of turf roughly 6–10 cm². Place it in a bucket and wait to see if any chinch bugs float to the surface. For more information, see the OMAFRA Factsheet, *Hairy Chinch Bugs in Lawns*, Order No. 08-019.

Grubs

Several species of grubs can cause damage by feeding on grass roots in home lawns. The most common grubs are:

- June beetle
- European chafer
- Japanese beetle

If animals such as skunks begin digging up the lawn or if small irregular patches of grass turn brown, it may indicate grubs present in the lawn. Check for grubs in late summer or early fall before damage is noticed. Lift a section of sod and soil, 10 cm square, with a spade,

and look for white, C-shaped grubs in the soil. Keeping the lawn well watered helps minimize grub damage. Beneficial nematodes may be applied for marginal grub control in the late summer. Follow the instructions carefully. For more information on grubs, see the OMAFRA Factsheet, *Grubs in Lawns*, Order No. 08-023w.

Sod Webworms

Sod webworms are caterpillars that feed in the thatch on home lawns. The adults are small, tan moths that fly around lawns at night. The caterpillars grow to 2 cm and are tan in colour with dark spots on their backs. They feed in the thatch, causing damage that is similar to grub damage, where areas of turf can be lifted like a carpet. They also leave behind soft green fecal pellets in the areas they are feeding. The damage occurs in September.

Bluegrass Billbug

Bluegrass billbugs are in the weevil family. The adults are black and 5 mm long. Larvae are small, white and legless with a brown head. Damage begins with small groups of plants turning yellow and dying. This occurs in mid-July to mid-August. Damage is usually spotty and rarely affects a whole lawn. Billbugs leave behind a sawdust-like excrement in areas they have been feeding. This is helpful in diagnosing the damage.

European Crane Fly

The European crane fly is a relatively new pest to lawns in Ontario. The adult crane fly resembles a large mosquito. The larvae are known as leatherjackets. They are light, greyish-brown with black specks. There is no visible head region. They range in size from 0.5–3.0 cm in length. Leatherjackets feed primarily on grass shoots during the evening and on grass roots during the day. Damage begins to show early-to-mid-May and peaks by mid-June. Heavy infestations of leatherjackets can chew the grass down to the bare soil.

Turfgrass Scale

Turfgrass scale is a typical scale insect that resembles an egg cut in half lengthwise. It is brown with a yellow stripe in the middle. The immature stage, called a crawler, is the size of the head of a pin. Typical damage is small patches of dead grass that do not green up in the spring. They are found mainly on sodded lawns and in general, do not cause much damage. During early July, crawlers can be found on shoes when you walk through the lawn.

Table 4. Summary of lawn-damaging insects.

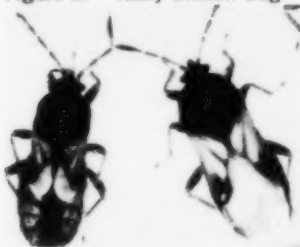
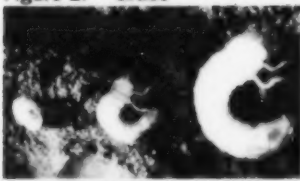
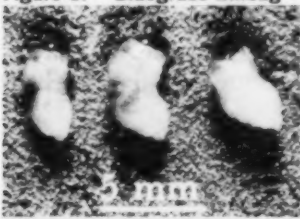
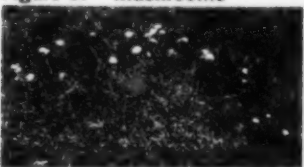
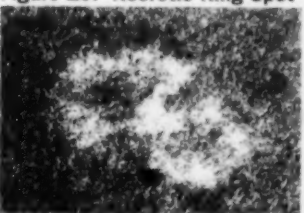
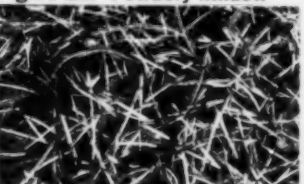
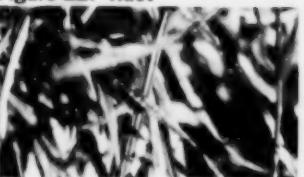
Insect	Description	Damage	Detection/Control
Figure 1. Hairy Chinch Bug 	• start as brick red nymphs in June/early July • as they mature, they turn grey • adults are 4 mm long and have an X on their backs	• turf appears sunken • chinch bugs suck plant juices from the grass leaves and stems • with heavy infestation, large areas of turf may die • dead turf does not pull out easily (still well rooted) • can destroy entire lawn in a season	• cut the ends off a metal can to make a cylinder and force it into the lawn • fill can with water and chinch bugs will float or • cut a 6–10 cm² piece of turf and place it in a bucket of water • wait to see if the chinch bugs float • turf species containing endophytic fungi show resistance to chinch bug feeding
Figure 2. Grubs 	• C-shaped white larvae with brown heads • range in size from 1–3 cm depending on the species	• feed on turfgrass roots • lawn lifts up like a carpet • starts in late September • animals (skunks, raccoons and starlings) dig up grubs	• cut 3 sides of a square and lift to uncover grubs • apply beneficial nematodes for marginal control
Figure 3. Bluegrass Billbug 	• adults are weevils about 5 mm long • larvae are small, white and legless with brown heads and are 5 mm long	• damage starts as small areas of yellow grass that pull away above the thatch • usually do not destroy entire lawns	• sawdust excrement is found in the areas where the billbugs are feeding • turf species containing endophytic fungi show resistance to billbug feeding
Figure 4. Sod Webworm 	• adult is a fawn-coloured moth • caterpillar is tan in colour	• feed in September in thatch • turf pulls away like a carpet	• soft green pellets found in dead grass area where grass can be easily pulled away • turf species containing endophytic fungi show resistance to sod webworm feeding
Figure 5. European Crane Fly (leatherjackets) 	• adult resembles a large mosquito • larvae are called leatherjackets • greenish grey with no distinguishing features	• leatherjackets feed in May and early June, causing damage • chew grass blades back to the ground level	• examine the top of the thatch in thinned areas, and leatherjackets will be visible in spring
Figure 6. Turfgrass Scale 	• typical scale insect • resemble an egg cut in half • brown with centre yellow stripe • immature stage (crawlers) size of the head of a pin	• small patches of dead grass that do not green up in the spring • mainly on sodded lawns • damage occurs in the spring	• during early July, crawlers can be found on shoes when you walk through the lawn • do not cause much damage

Table 5. Summary of common lawn diseases.

Name	Description	Conditions favouring disease	Damage and control
Figure 7. Fairy Ring 	• circles or arcs of dark green grass or dead grass • may be mushrooms growing in the ring	• decaying organic matter in soil	• repeated deep cultivation and drenching with water
Figure 8. Leaf Spot 	• begins as small oval reddish-brown spots on leaves in early spring • under hot, humid conditions spots can spread to kill stems and crowns, causing lawn to thin or die out (melting out)	• hot, humid conditions • lawns that have been fertilized recently • Kentucky bluegrass is most susceptible	• raise mowing height • lightly fertilize to encourage recovery • irrigate in the morning only
Figure 9. Mushrooms 	• grow after a rain		• mowing will keep them under check
Figure 10. Necrotic Ring Spot 	• appears as roughly circular patches often with green tufts of grass inside resembling a donut	• wet, cool conditions in spring promotes disease • symptoms appear during a drought • often a problem of sodded lawns	• encourage deep rooting • water lightly and frequently during dry periods • overseed with "turf-type" perennial ryegrass
Figure 11. Powdery Mildew 	• greyish-white powder on leaves and stems	• shaded areas that are kept moist and have poor air circulation	• decrease shade and improve air circulation • usually thins turf but does not completely kill it
Figure 12. Rust 	• yellow flecks on leaves • reddish-brown pustules on underside of leaves that produce reddish-yellow spores • during a heavy infection, found on shoes and mower blades	• stress caused by low nitrogen and drought • perennial ryegrass is the most susceptible	• fertilize and water infrequently • mow high and frequently
Figure 13. Snow Moulds 	• circular or irregular straw-coloured patches on lawn after snow melts	• long periods of snow cover, lush grass growth and long matted grass going into the winter • more prevalent in areas where snow has drifted or where snow is piled up during winter	• do not apply nitrogen during October • in the spring, rake matted areas to encourage drying; fertilize lightly to encourage recovery

Endophytes

One way to combat the damage caused by leaf-feeding insects is to plant grasses that contain endophytes. Endophytes are fungi that grow inside the grass plant and make it taste bad. Lawn insects repelled by endophytes are hairy chinch bugs, bluegrass billbugs and sod webworms. Lawn species that may contain endophytes are perennial ryegrass, fine fescues and tall fescue. Consult your local garden centre or seed supplier about the endophytic grasses they sell.

If a lawn becomes damaged or thins as a result of insect feeding, it can be repaired by overseeding or sodding. See the sections on overseeding and sodding earlier in this Factsheet for more information.

OTHER PESTS

Moss

Mosses are primitive forms of green plants that form dense, low-growing clumps in a lawn. Moss plants have a tremendous capacity to spread. They produce large numbers of spores, each of which can give rise to a new moss plant. They can also be propagated vegetatively by mowing. Mosses are poor competitors with a healthy lawn and are only a problem when the lawn is weakened by poor growing conditions. The following conditions weaken a lawn and promote moss invasion:

- poor aeration
- poor drainage
- low fertility
- high acidity
- heavy shade
- frequent irrigation

Cultural methods can be effective in controlling moss:

- Maintain adequate fertility, especially nitrogen (2.0 kg/100 m² of actual N per year).

- Control thatch by vigorous raking, aeration or vertical mowing.
- Reduce shade by pruning trees.
- Maintain a soil pH of between 6 to 7 — apply lime if soil is acidic.
- Improve surface drainage.
- Reduce compaction and increase aeration by spiking, slicing or aerifying with a mechanical aerifier.
- Irrigate deeply and infrequently.
- Do not remove more than one-third of the top growth at one time when mowing and mow at a height appropriate for the grass species.

DISEASE MANAGEMENT

Disease problems in home lawns are minimal. Excessive fertility can cause succulent growth that is more susceptible to diseases. When establishing or renovating a lawn area, select varieties that are resistant to various diseases. Improper irrigation also contributes to lawn diseases. Make sure to water in the early morning to minimize the length of time that the lawn stays wet. A summary of common turfgrass diseases on home lawns is shown in Table 5.

If a lawn becomes damaged or thins as a result of lawn diseases, it can be repaired by overseeding or sodding. See the sections on overseeding and sodding earlier in this Factsheet for more information.

RESOURCES

OMAFRA Factsheets:

Grubs in Lawns, Order No. 08-023w (web only)

Hairy Chinch Bugs in Lawns, Order No. 08-019

Lawn Establishment, Order No. 08-025w (web only)

Lawn Renovation, Order No. 08-021w (web only)

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